WE CLAIM:

1. An optical interconnect adapted to direct a first subset of an input optical signal from a first optical fiber to a second optical fiber, the input optical signal containing a plurality of wavelengths, the optical interconnect comprising:

a wavelength selective element adapted to act upon the input optical signal to produce an intermediate optical output signal containing the first subset of the plurality of wavelengths;

a band-modulo demultiplexer having a free spectral range, the band-modulo demultiplexer being adapted to receive the intermediate optical output signal of the wavelength selective element, the band-modulo demultiplexer being adapted to provide one or more optical output signals; and

a wavelength conversion resource adapted to convert the one or more optical output signals of the band-modulo demultiplexer to respective different wavelengths.

2. An optical interconnect adapted to direct a first subset of an input optical signal from a first optical fiber to a second optical fiber, the input optical signal containing a plurality of wavelengths, the optical interconnect comprising:

a wavelength selective element adapted to act upon the input optical signal to produce an intermediate optical output signal containing the first subset of the plurality of wavelengths;

a band-modulo demultiplexer having a free spectral range, the band-modulo demultiplexer being adapted to receive the intermediate optical output signal of the wavelength selective element, the band-modulo demultiplexer being adapted to provide one or more optical output signals;

a wavelength conversion resource adapted to convert the one or more optical output signals of the band-modulo demultiplexer to respective different wavelengths; and

an optical combiner for combining the converted optical output signals into a single optical signal on the second optical fiber.

3. The optical interconnect as claimed in claim 2, wherein the wavelength conversion resource comprises one or more optical wavelength converters, each converter adapted to convert a respective one of the one or more optical output signals to a corresponding converted optical output signal having a different wavelength.

4. The optical interconnect as claimed in claim 3, wherein each optical wavelength converter comprises an optical-to-electrical-to-optical wavelength converter.

5. The optical interconnect as claimed in claim 4, wherein each optical wavelength converter comprises a broadband optical receiver to receive the respective one of the one or more optical output signals, the broadband optical receiver adapted to produce a corresponding electrical signal.

6. The optical interconnect as claimed in claim 5, wherein each optical wavelength converter further comprises a tuneable narrow-band optical transmitter adapted to receive the electrical signal and to generate the corresponding converted optical output signal.

7. The optical interconnect as claimed in claim 2, further comprising fully optical interconnect resources to direct a second subset of the input optical signal from the first optical fiber to the second optical fiber.

8. The optical interconnect as claimed in claim 2, wherein the optical combiner comprises a band filter.

9. The optical interconnect as claimed in claim 2, wherein the optical combiner comprises a band-modulo optical multiplexer.

10. The optical interconnect as claimed in claim 2, wherein the optical combiner comprises an optical add/drop multiplexer.

11. The optical interconnect as claimed in claim 2, wherein the selected subset consists of an arbitrary subset of wavelengths from the plurality of wavelengths.

12. The optical interconnect as claimed in claim 11, wherein the arbitrary subset of wavelengths is subject to a constraint that no two wavelengths in the arbitrary subset are separated by a multiple of the free spectral range.

13. The optical interconnect as claimed in claim 2, wherein the wavelength selective element is adapted to select a contiguous set of wavelengths.

14. The optical interconnect as claimed in claim 2, wherein the wavelength selective element is a bandpass filter having a passband.

15. The optical interconnect as claimed in claim 2, wherein the wavelength selective element comprises a bank of components that are individually selectable, each component being adapted to select a respective contiguous set of wavelengths.

16. The optical interconnect as claimed in claim 15, wherein each component is a bandpass filter having a passband.

17. The optical interconnect as claimed in claim 2, wherein the first optical fiber is part of a first optical communication ring and the second optical fiber is part of a second optical communication ring.

18. An optical interconnect system comprising at least a first and a second optical interconnect according to claim 2 wherein the first optical fiber of the first optical interconnect is the second optical fiber of the second optical interconnect and the first optical fiber of the second optical interconnect is the second optical fiber of the first optical interconnect.

19. An optical interconnect according to claim 2 wherein a photonic cross-connect is interposed between the band-modulo demultiplexer and the wavelength conversion resource and between the wavelength conversion resource and the optical combiner.

20. An optical interconnect system comprising a plurality of optical interconnects according to claim 19 wherein the photonic cross-connect and the wavelength conversion resource are shared among the plurality of optical interconnects.

21. An optical interconnect system according to claim 20, having at least a first and a second optical interconnect, wherein the first optical fiber of the first optical interconnect is the second optical fiber of the second optical interconnect and the first optical fiber of the second optical interconnect is the second optical fiber of the first optical interconnect.

22. A method of wavelength management in an optical network comprising steps of:

providing an optical interconnect adapted to direct a first subset of an input optical signal from a first optical fiber to a second optical fiber, the input optical signal containing a plurality of wavelengths, the optical interconnect comprising a wavelength selective element adapted to act upon the input optical signal to produce an intermediate optical output signal containing the first subset of the plurality of wavelengths, a band-modulo demultiplexer having a free spectral range, the band-modulo demultiplexer being adapted to receive the intermediate optical output signal of the wavelength selective element, the band-modulo demultiplexer being adapted to provide one or more optical output signals, a wavelength conversion resource adapted to convert the one or more optical output signals of the band-modulo demultiplexer to respective different wavelengths and an optical combiner for combining the converted optical output signals into a single optical signal on the second optical fiber;

determining desired input wavelengths to be directed from the first optical fiber to the second optical fiber;

controlling the wavelength selective element to select the desired input wavelengths;

determining desired respective different output wavelengths to which to convert the desired input wavelengths; and

controlling the wavelength conversion resource to output the desired respective different wavelengths.